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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/534,110
Filing Date: May 06, 2005
Appellant(s): FLYTZANI-STEPHANOPOULOS ET AL.

____
Joseph Milstein
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 04/17/2009 appealing from the Office action mailed 12/19/2008.

0(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

Liu, W., Flytzana-Stephanopoulos, M. "Total Oxidation of Carbon Monoxide and Methane over Transition Metal-Fluorite Oxide Composite Catalysts" Journal of Catalysis 153 (1995), pp. 317-332

Bartlett, R. "Solution Mining: leaching and fluid recovery of minerals", 2nd Edition. Gordon and Breach Science Publishers, (1998), pp. 17-18, 20-22, 39

6,723,298	Baumann et al.	04-2004

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over W. Liu et al. (1995) in view of Bartlett et al. (1998), as generally set forth in the rejection mailed 12/19/2008.

In regard to claims 1 and 2, Liu et al. teach a catalyst preparation method. A lanthanum-cerium nanocrystalline support is provided. Gold nanoparticles (crystalline structure) are deposited on the support [See Page 318, Sections 2.1, 3.1]. The total structure lacks a shared crystal structure.

The Liu reference fails to teach removing some of the metallic crystalline particles from the surface.

Bartlett et al. teach removal of gold via cyanide leach solutions [See Pages 17-18, 20-21].

It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to remove the gold metallic crystalline particles of the catalyst

taught in the Liu reference via a leaching method taught in Bartlett et al. because in this way, a portion of the gold particles could be recovered and reused in a similar catalyst production process. Recovery of the expensive gold catalytic material in this way reduces production costs. The boundary of the gold particle/cerium oxide is the active site for CO oxidation [See Liu, Page 328, Section 4.1]. Therefore leaching to remove the majority of the gold would enhance the interaction between CO gas and the reaction sites.

In regard to claims 3 and 4, Liu et al. teach the cerium oxide supported catalysts were prepared by coprecipitation [See Page 305, Section 2.1].

In regard to claim 5, the CeO_2-La support structure prepared by the method of claim 1 has a microcrystalline structure.

In regard to claim 6, Liu et al. teach preparation of the Ce(La) substrate by drying an aqueous salt solution of the metal to form the ceramic structure. Drying takes place at 300°C. While the Liu reference does not teach sintering at a temperature of 400°C the claimed temperature would have been obvious to one of ordinary skill because it represents an optimization of a known range which would occur through routine experimentation through prior art conditions. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical.

"[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). See MPEP 2144.05 II-A. Achieving a sintering temperature in the preparation of the substrate disclosed by Liu et al. represents an obvious and optimizable process variable.

In regard to claims 7-9 and 18, Liu et al. teach a lanthanum doped cerium oxide/gold catalyst [See Page 318, Section 3.1].

In regard to claims 10-11, the Bartlett reference teaches leaching with a solution of NaCN.

In regard to claim 12, Bartlett et al. teach a pH range is typically between 10 and 11 [See Page 39]. Also See MPEP 2144.05 II-A (mentioned above) for explanation of obviousness of claimed concentration ranges. Because the solution taught by Bartlett is in the same pH range, one of skill in the art would expect a similar mole percent NaCN to be present.

In regard to claims 13-16, Bartlett et al. teach removal of close to 100% of gold via NaCN leaching [See Page 22, Figure 2.3].

In regard to claim 17, the Liu reference discloses use of the catalyst for total oxidation of carbon monoxide and methane (water gas shift reaction).

In regard to claim 20, Liu et al. teach a lanthanum doped cerium oxide/gold catalyst [See Page 318, Section 3.1]. Oxygen vacancies and crystal defects are created by doping a cerium with a cation with a lower oxidation state.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over W. Liu et al. (1995) in view of Bartlett et al. (1998) and further in view of Baumann et al. (US Patent No. 6,7,23,298), as generally set forth in the rejection mailed 12/19/2008.

The Liu and Bartlett reference teach every element of the method of claim 1 but fail to teach a substrate which comprises one of the materials in claim 19.

Baumann et al. is drawn to a water gas shift catalyst. The substrate support can be made from a metal oxide, mixed oxide, or zeolite [See Column 4, lines 7-9].

It would have been obvious to one of ordinary skill in the art, at the time of Applicant's invention to utilize any number of supports, including zeolite supports because these materials have a wider range of porosities which may be useful in a gaseous water gas shift reaction.

(10) Response to Argument

Claim 1

Applicant argues the Liu reference does not teach or suggest producing the "structure lacking crystallinity" nor does the reference teach the second step of Claim 1 – "producing on said surface of said substrate component a second component having metallic crystalline particles" and a "structure lacking crystallinity".

Liu et al. teach a catalyst preparation method. A lanthanum-cerium nanocrystalline support is provided. Gold nanoparticles are deposited on the support [See Page 318, Sections 2.1, 3.1]. In this way the substrate is the lanthanum-cerium support and the second component is understood to be the gold nanoparticles. Gold is inherently a crystalline metallic substance having a cubic face centered structure. Small metallic gold particles are evenly distributed on the support matrix. The particles have an average size of 8nm [See Page 318, Sections 2.1, 3.1].

For the reasons below, the teaching of the reference are proper and should be affirmed:

1) Because Liu teach discrete particles with individual diameters on the substrate, the second component on the substrate does not share a common crystal structural order.

2) Even within materials that are completely crystalline, degrees of structural imperfection are present. The degree of crystallinity is not explicitly disclosed and most materials have a level of hypocrystallinity.

3) Applicant’s process of preparation cited in the specification is substantially similar to the method taught in the Liu reference [See Paragraphs 0074-0081]. The preparation methods of Liu et al. are even cited in Applicant's Paragraph 0076. One would expect catalysts prepared via the same methods to have the same characteristics, especially with respect crystallinity. See MPEP 2112. *In Re Best*.

Applicant argues the Liu reference fails to teach the step of "removing selectively from said surface of said substrate component at least some of said metallic crystalline particles, leaving associated with said substrate component at least a portion of said structure lacking crystallinity.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

For the reasons below, the teaching of the reference are proper and should be affirmed:

1) The Bartlett reference is provided to remedy this deficiency in the Liu reference.

2) Bartlett et al. teaches removal of gold via cyanide leach solutions [See Pages 17-18, 20-21]. Cyanide leaching processes are not capable of removing all of the gold

and so the removal of a selective amount of gold is to be expected when the composition developed by Liu et al. is subjected to such a removal process. The gold “second component” and lanthanum-cerium support substrate do not share a common crystal structure and therefore the total structure lacks crystallinity. While the individual components - Lanthanum, cerium, and gold - are crystalline materials, the method of preparation, namely the deposition of gold on the support does not constitute the creation of a common/shared crystallinity.

Applicants argue the ability to retain catalytic activity after removal of the metal is an unexpected result.

It would have been obvious to one of ordinary skill in the art at the time of Applicant’s invention to remove the gold metallic crystalline particles of the catalyst taught in the Liu reference via a leaching method taught in Bartlett et al. because Liu gives a motivation, in that the boundary of the gold particle/cerium oxide is the active site for CO oxidation [See Liu, Page 328, Section 4.1].

Applicants argue the references do not teach the selective removal of at least some of the metallic crystalline particles.

Selective removal is defined in the specification in amounts ranging from 10-90% of the metallic component. Bartlett et al. teach removal of gold via cyanide leach solutions [See Pages 17-18, 20-21] at up to 100% of gold via NaCN leaching [See Page

22, Figure 2.3] and various amounts that are included in the interpretation of “selective” range.

In response to **applicant's argument** that the Bartlett reference is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant’s endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). Applicant argues that the Liu and Baumann references cannot be combined because the intended operating conditions are mutually exclusive. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention (process) and the prior art in order to patentably distinguish the claimed invention from the prior art. The discussion of the intended use of the catalyst produced in the references or by the claimed invention, whether as a water gas shift reaction or the oxidation of carbon monoxide or hydrocarbons, does not distinguish from the previously disclosed production process steps taught in the Liu and Bartlett references.

Applicants argue the Bartlett reference teaches away from the use of cyanide leaching for gold particles.

While Bartlett et al. note that cyanide leaching is not useful for all gold ore deposits, it is especially useful for gold particles one micron or smaller [See Barlett,

Page 17]. In the case of the Liu reference and Applicant's invention, the gold particles are in the range of a few nanometers.

In response to **applicant's argument** that the references fail to show certain features of applicant’s invention, it is noted that the features upon which applicant relies (i.e., the time required for removal of the second component metallic particles) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In response to **applicant's argument** that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

In this case, the Liu reference gives motivation to combine a process to remove some of the gold particles (like leaching with cyanide) in order to improve the catalytic function of the material being produced. The boundary of the gold particle/cerium oxide is the active site for CO oxidation [See Liu, Page 328, Section 4.1]. Therefore leaching

to remove the majority of the gold would enhance the interaction between CO gas and the reaction sites. Furthermore, the selective removal of the metallic particles via a leaching method taught in Bartlett et al. would result in a portion of the gold particles being recovered and possibly reused in a similar catalyst production process. Recovery of the expensive gold catalytic material in this way reduces production costs. Bartlett discloses the economic benefits of recovering these metals via extraction processes [See Preface xxiii].

Applicants argue the basis for making such a combination between the Liu and Bartlett reference is “impermissible hindsight”. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Both references provide motivation to remove an amount of the metallic material to enhance interaction between gas and the catalytic reaction sites [See Liu, Page 328, Section 4.1] or to recover expensive material [See Preface xxiii].

<u>Claims 2-20</u>

Applicants arguments to these dependent claims are based on the arguments presented for claim 1.

<u>Claim 19</u>

Applicants argue the combination of References Liu, Bartlett, and Baumann fails to teach the step of "producing on said surface of said substrate component a second component having metallic crystalline particles and a structure lacking crystallinity" and fails to teach the step of "removing selectively from said surface of said substrate component at least some of said metallic crystalline particles, leaving associated with said substrate component at least a portion of said structure lacking crystallinity".

For the reasons given above the teachings of the Liu and Bartlett references with regard to these features are proper and should be affirmed. The Baumann reference has been provided to remedy the deficiencies of the Liu and Bartlett reference with regard to the substrate material. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicants argue the basis for making such a combination between the Liu, Bartlett, and Baumann references is “impermissible hindsight”. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Both references provide motivation to remove an amount of the metallic material to enhance interaction between gas and the catalytic reaction sites [See Liu, Page 328, Section 4.1] or to recover expensive material [See Preface xxiii].

Baumann et al. is drawn to a water gas shift catalyst. The substrate support can be made from a metal oxide, mixed oxide, or zeolite [See Column 4, lines 7-9]. It would have been obvious to one of ordinary skill in the art, at the time of Applicant’s invention to utilize any number of supports, including zeolite supports because these materials have a wider range of porosities which may be useful in a gaseous water gas shift reaction [See Baumann, Column 4, lines 10-15].

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Jennifer.Smith./

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